



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/619,433	07/16/2003	Takeo Ishibashi	402708	6921
23548	7590	10/19/2004	EXAMINER	
LEYDIG VOIT & MAYER, LTD 700 THIRTEENTH ST. NW SUITE 300 WASHINGTON, DC 20005-3960			PHAM, THANH V	
			ART UNIT	PAPER NUMBER
			2823	

DATE MAILED: 10/19/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

**Application No.**

10/619,433

**Applicant(s)**

ISHIBASHI ET AL.

**Examiner**

Thanh V Pham

**Art Unit**

2823

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 15 September 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1 and 5-8 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1 and 5-8 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Response to Amendment*

1. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

2. Claims 1, 5 and 8 are rejected under 35 U.S.C. 102(a) as being anticipated by Jang et al. US 6,362,093 B1.

*Re claim 1*, the Jang et al. reference discloses a method of manufacturing a buried wiring structure comprising: depositing an insulating film 18 on under-layer wiring 11; forming a first depressed portion 23 in the insulating film; applying as the burying material an organic polymeric material 24 *having substantially the same etching rate as the insulating film*, col. 9, lines 20-35, and to the first depressed portion and on said insulating film, filling the first depressed portion, fig. 3; chemical mechanical polishing, col. 9, line 63, the burying material until the insulating film is exposed, leaving the burying material in the first depressed portion; forming a resist 26 having a pattern of a second depressed portion that overlaps the first depressed portion on the insulating film where the burying material is present; etching the burying material and the insulating film, using the resist as a mask, to form the second depressed portion, fig. 4; removing the resist and the burying material left after the etching; and depositing an electrically conductive material 30 in the first depressed portion and the second depressed portion, fig. 5.

Art Unit: 2823

*Re claim 5*, the method includes the burying material contains no aromatic compounds, col. 9, lines 36-52.

*Re claim 8*, the first depressed portion is a contact hole and the second depressed portion is a wiring channel, the contact hole being deeper and narrower than the wiring channel, fig. 5, col. 1, lines 17-38 and col. 10, lines 3-65.

3. Claims 6 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jang et al. as applied to claims 1, 5 and 8 above, and further in view of Jain et al. US 5,741,626.

The Jang et al. reference discloses substantially all of the steps of the instant invention but lacks an antireflective film on the insulating before forming the resist. However, the Jang et al. reference, col. 2, lines 25-30, introduces Jain et al. reference wherein "the ARC may be formed in any of several locations when forming the dual damascene structure", e.g., the ARC 46 formed with different material with the burying material 20 such that the burying material and the antireflective film are not soluble in each other in an alternate embodiment, figs. 9-15.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to apply an antireflective film on the insulating film before forming the resist as taught by Jain et al. into the process of manufacturing a buried wiring structure of Jang et al. because such a known step would be selected in order to improve the quality of the photolithography/etching applied afterward.

***Response to Arguments***

4. Applicant's arguments filed 09/15/04 have been fully considered but they are not persuasive.

5. Applicant argues that Yang's sacrificial fill layer 24 is a material that "is not etched at substantially the same rate at which the second dielectric layer 18 is etched" based on the protruding remnant of the sacrificial fill layer in fig. 4 of Yang. The examiner does not agree. Yang's col. 9, lines 20-35 teaches:

"the sacrificial via fill layer 24 formed of a material which is preferably not exceedingly etched within an etching plasma which efficiently etches the patterned second dielectric layers 18a and 18b, but may nonetheless also readily be stripped from the microelectronic fabrication whose schematic cross-sectional diagram is illustrated within FIG.3 while employing a stripping method which does not appreciably etch the patterned second dielectric layers 18a and 18b, the patterned etch stop layers 16a and 16b and the patterned first dielectric layers 14a and 14b."

Further, the protruding remnant of the sacrificial fill layer 24 in fig. 4 is only one of the preferred of Yang as in col. 10, lines 53-65:

Preferably, as is also illustrated within the schematic cross-sectional diagram of FIG. 4, the sacrificial via fill layer 24 etches at a rate at least somewhat lower than the pair of second patterned dielectric layers 18a and 18b, thus leaving remaining the etched sacrificial via fill layer 24a which rises above the patterned etch stop layers 16a and 16b which define, in part, the reduced height via."

Furthermore, the etching "at a rate at least somewhat lower than" is considered as "substantially the same etching rate" in the claim and fig. 4 shows "in part, the reduced height via" in an intermediate product.

Therefore, the alleged "residue from etching that can attach to the protruding stump" on page 5 of the Remark is irrelevant.

**Conclusion**

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

7. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thanh V. Pham whose telephone number is 571-272-1866. The examiner can normally be reached on M-T (6:30-5:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on 571-272-1855. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

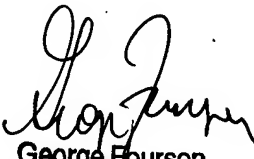
Art Unit: 2823

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

WP

TvP

10/05/04

  
George Fourson  
Primary Examiner